Space Weather Forecast

Issued on Tuesday, 27 February 2024 at 00:47 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Minor/Moderate R1/R2 Radio Blackouts from Moderate X-ray flares remaining likely.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been low over the past 24 hours, with X-ray activity having been confined to low Common-class and a peak flare of this ilk at 26/0619UTC. This flare emanated from the largest and most complex sunspot group on the facing side on the northwest of the Sun. This group showed some slow changes in the period, spanning a full 18 degrees of solar longitude and showing a large but stable areal coverage. The main changes in this group in the 24 hours came as part of its leading cluster retrogressed into the region's central portion to reinforce a potentially unstable magnetic configuration here.

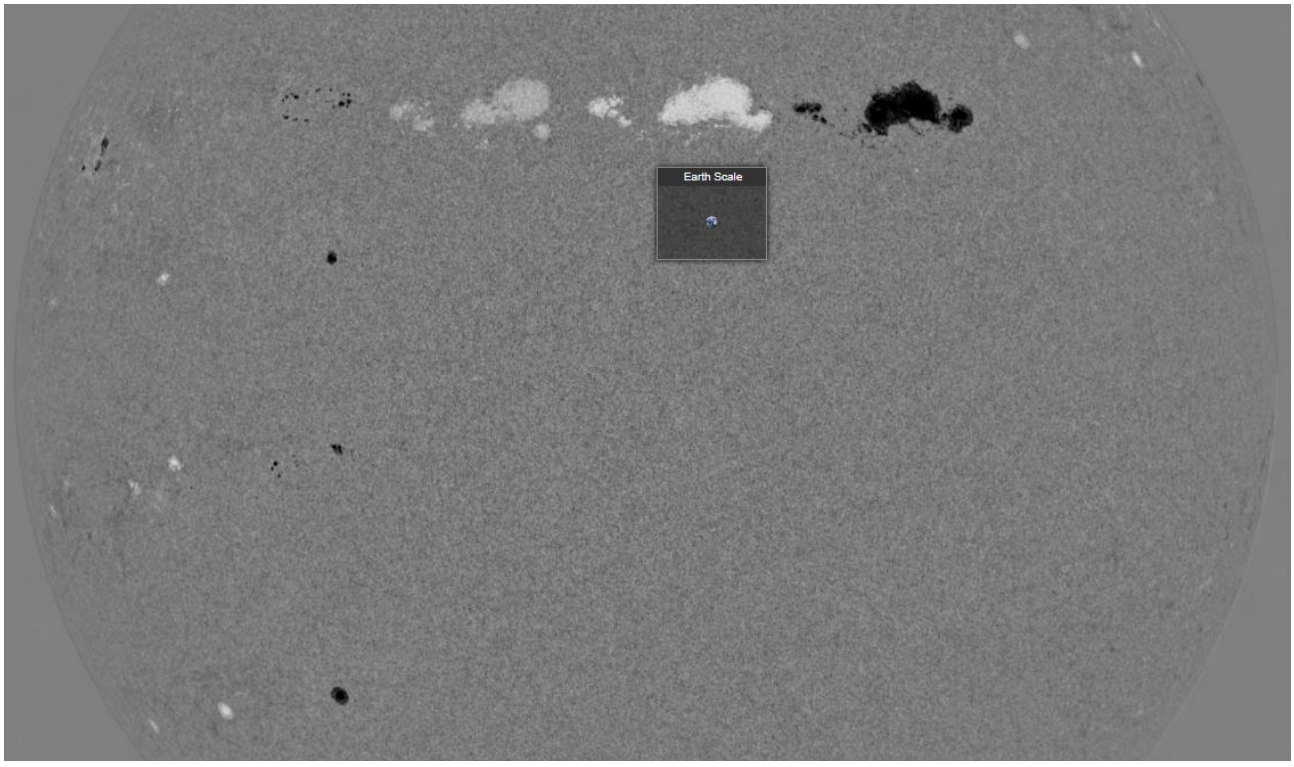

Figure 1: Helioviewer.org-generated visible light difference imagery showing the footprint of active regions at 26/2330UTC (black) and at previous 36-hour intervals in white (i.e. 25/1130UTC and 23/2330UTC). One sunspot group dominates in the upper central portion of the facing side.

The above was one of seven sunspot groups on the facing side of the Sun for a time, with a new group arriving in the northeast as a second faded from view in the northwest. Other spots paled in

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comparison to the main region (on paper), but the main trends were a spreading tendency in a small magnetically bipolar group in the northeast, and at the same time some consolidation in yet another small group to its east.

There were no Earth-directed Coronal Mass Ejections (CMEs) observed in available satellite imagery, with no significant movements in any of the front-sided 'filaments' (arcs of plasma) noted, and with activity confined to the off-going western solar horizon and also the high latitude northeastern far side.

Solar Wind / Geomagnetic Activity: Solar winds were reflective of the initial waning influence of a minor CME (since the UTC day of 24 February) followed by either a slow solar wind regime or weak 'coronal hole' fast wind influence, although the latter is now less likely given the behaviour of the solar wind late in the UTC day. It should be stated that no conclusive entry into the fast wind of the coronal hole was noted today or in preceding days, however it is possible that this was masked by the CME and is underway, else being very delayed and muted as a consequence.

Solar wind speeds have been slightly elevated, with the number of particles in the wind level and near their long-term background. The associated magnetic field fell from early slightly elevated highs in the tail of the CME to reach background levels, however it rose again later in the period to near earlier highs. The north-south component calmed for a time after starting slightly elevated, but became larger in magnitude once again to end the period.

The net result of the above solar wind measures fell to become largely quiet, remaining below Minor Geomagnetic Storm G1 throughout.

Energetic Particles / Solar Radiation: No solar radiation storms were observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Further Moderate-class flares are still likely, with an ongoing slight chance of Strong-class. This risk is assessed as being constant through the four-day period, with the behaviour of the largest and most magnetically complex sunspot region the dominant consideration.

Solar Wind / Geomagnetic Activity: No CMEs feature in the forecast. The only 'coronal hole' fast wind due in the period is now either underway to little fanfare or else very late and is most likely to peak below G1 Minor Geomagnetic Storm. The second half of the UTC working week is still expected to be more reliably quiet that the start (barring any new CMEs).

Energetic Particles / Solar Radiation: Solar radiation storms of S1 or above are assessed as a rising slight chance day-on-day, with the main risk factor being any proton-rich flares from the largest group, which is nearing a potent position on the west of the facing side of the Sun - should it flare appropriately.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	1	1	1	1
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	60	60	60	60
Very Active	R3 to R5 X	No	10	10	10	10

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	15	15	20	20
Very Active	≥ S3 *	No	2	2	5	5
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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